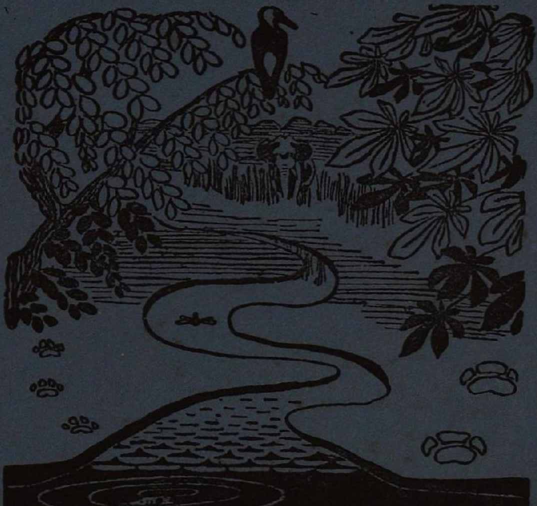
VOL. XXVI. DECEMBER, 1953 NO. 3

JOURNAL OF THE BENGAL NATURAL HISTORY SOCIETY.



Edited by : S. THOMAS SATYAMURTI, M.A., F.Z.S.

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BENGAL NATURAL HISTORY SOCIETY.
Estd. 1923.

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The Society under the name Darjeeling Natural History Society was started about the end of 1923, the objects being to maintain the Museum in a proper condition, to promote the study of Natural History and to get together as complete as possible collections of Natural History specimens from a limited area, including "the Civil Districts of Jalpaiguri and Darjeeling and the State of Sikkim", as well as what could be procured from the neighbouring countries of Tibet, Bhutan and Nepal.

Government and Municipal grants not being sufficient for our purpose, it was proposed to enrol members so as to increase our funds, and a quarterly journal has been started. The journal is no longer confined to articles on the Natural History of the above-mentioned area, but includes those from anywhere. It is hoped that everybody will join the Society and co-operate to make the Museum and Journal a success.

The annual subscription is only Rs. 10 ; Life membership Rs. 150 ; those who have been members for over twenty years can become Life members on payment of Rs. 75.

Members get copies of the Journal free and other privileges. All facilities are also given to members to study the museum collection and expert advice is given to them regarding collection, preservation and identification of specimens.

Application for membership should be made to :—

THE CURATOR,
Natural History Museum,
Darjeeling.

NOTICE

Members of the Bengal Natural History Society are informed that Sri S. Thomas Satyamurti, Curator, Natural History Museum, Darjeeling, is taking up his appointment as Curator, Natural History Section of the Prince of Wales Museum, Bombay, from January, 1954. The Committee have therefore decided to advertise the post, and a copy of the advertisement is furnished below :—

Applications are invited for the post of Curator, Natural History Museum, Darjeeling, on a Pay Scale of Rs. 300—15—450, Dearness Allowance as under Government of West Bengal Rules, Consolidated T.A. of Rs. 50/- per mensem, benefit of contributory Provident Fund, furnished quarters and free electric current. Candidates should have a University degree in Zoology, some practical knowledge of Natural History, a working knowledge of Taxidermy and photography, experience of out-door collecting and ability to edit a Journal. Applications with testimonials and giving names of two responsible refrees should reach the undersigned by the 31st December, 1953.

(Sd.) S. DUTT-MAZUMDAR,
Deputy Commissioner & Chairman,
Natural History Museum,
Darjeeling.

Dated 31st October, 1953.

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The Serow or Thar (*Capricornis sumatraensis*): Young male, 6—7 months old.
Shot by Shri S. Dutt-Mazumdar, I.A.S., Deputy Commissioner, Darjeeling
at Latpanchar, Darjeeling District at an altitude of 5000 feet,
and recently mounted and exhibited at the
Natural History Museum, Darjeeling.

JOURNAL

OF THE

BENGAL NATURAL HISTORY SOCIETY

Vol. XXVI. DECEMBER, 1953. No. 3

BIRDS OF THE DUARS

By

C. M. Inglis, F.Z.S., C.M.B.O.U.

(Continued from p. 56, Vol. XXVI, No. 2)

Family *Timaliidae.*

Sub-family *Timaliinae.*

35. The Long-billed Wren-Babbler.

Rimator malacoptilus Blyth.

(Fauna Br. Ind 2nd Ed., No. 262).

Description.—Length 5 inches. Sexes alike. Upper plumage dark rufescent-brown with very distinct fulvous shaft-streaks; the back feathers have the inner webs black; rump and above the tail, rufescent; cheeks black and fulvous with a black line above; chin fulvous-white; rest of lower plumage rufescent-brown with large, fulvous shaft-streaks; patch below the tail ferruginous.

Bill dark brown, lighter at base of lower mandible; iris red-brown; legs fleshy.

It has a long, slightly curved, slender bill, a very short tail and lax plumage.

Distribution and habits.—O'Donel saw this bird above Baksa Duar but I have never come across it in the district. It is not easily observed as its colour blends with that of the leaves which it turns over in its search for insects. It goes about in pairs and keeps much to the ground in forest or scrub, and if disturbed, while in the open, quickly disappears into the undergrowth. Stuart Baker says "it has a sweet, chirping

whistle which it utters as a call or when frightened or disturbed."

36. The Indian Rusty-vented, or Abbot's, Babbler.

Malacocincla sepiaria abboti Blyth.

(Fauna Br. Ind. 2nd Ed., No. 267).

Description.—*Length 6½ inches. Sexes alike.* Upper plumage rich olive-brown; tail, and above it, deep rufous; round the eye, the chin and throat, grey; lower plumage white, earthy ferruginous on the sides; patch under the tail bright ferruginous.

Bill, upper mandible dark horny brown, base of the lower bluish-horny; iris reddish-brown; legs pale fleshy.

It has a stout bill and rather a short tail.

Distribution and habits.—Very common in forest undergrowth and in low trees in it. It goes about in pairs, but being such a common bird, it sometimes appears as if there were parties. It is rather a confiding Babbler and feeds a lot on the ground, its food consisting wholly of insects. It has quite a sweet note, but is a very silent bird.

The breeding months are April and May and it makes a bulky cup of a nest formed with dead leaves, grass and weed-stems and lined with roots; it is loosely put together and placed in a bush, or briars, close to the ground and inside deep jungle. The eggs are three in number, sometimes five, of a beautiful, bright salmon tint with a few deep red blotches and short twisted lines as well as some under-lying lavender spots. They measure about 0.85 by 0.65 inches.

37. The Sikkim Black-throated Babbler.

Stachyris nigriceps nigriceps (Blyth).

(Fauna Br. Ind. 2nd Ed., No. 270).

Description.—Length 5½ inches. Sexes alike. Top of head black, the feathers edged with white; upper plumage olive-

brown; sides of head fulvous-brown; checks white; lower plumage bright fulvous, the flanks and abdomen olive.

Bill, upper mandible blackish, lower one fleshy or slaty; iris orange-brown; legs fleshy brown.

Distribution and habits.– I obtained this little Babbler at Baksa Duar in the hills and at Hasimara, Hantapara, Nangdala and the Rehti forest in the plains. It is a great skulker and loves thick undergrowth and grass mixed with bushes, going about in small parties hunting for insects; it seldom descends to the ground. It is a quiet bird and only occasionally utters a low whistle.

It may breed in the hills and foothills, above 1,000 feet; the breeding months are May and June. It makes a cup-shaped, or domed nest of bamboo-leaves and fern-fronds, lined with grass, moss and fern-roots. It places it on the side of a bank, in scrub jungle, forest or grassland. The eggs number four and are pure white in colour. They measure about 0.76 by 0.58 inches.

38. The Nepal Golden-headed Babbler.

Stachyris chrysoea chrysoea (Blyth).

(Fauna Br. Ind. 2nd Ed., No. 273).

Description.—Length 4½ inches. Sexes alike. Top of head, and lower plumage, bright yellow, the crown and nape streaked with black; in front of the eye and a short moustachial streak black; upper plumage olive-yellow.

Bill slaty-horn above, paler below; iris golden-brown; legs yellowish-brown.

Distribution and habits.—The only place where I have seen this beautiful little Babbler is at Baksa Duar, where it appeared to be rare. It is said to go about in quite large flocks during the winter, keeping to the undergrowth in tree forest and bushes. It is an active little bird continually on the move in its hunt for insects. According to Stuart Baker "the whole flock keeps up a constant, soft, low twittering which rises to shriller and louder notes of expostulation when disturbed"

39. The Red-headed Babbler.

Stachyris (Stachyridopsis) ruficeps ruficeps (Blyth).

(Fauna Br. Ind. 2nd Ed., No. 277).

Description.—Length, 5 inches. Sexes alike. The whole of the top of the head, including nape, bright chestnut; upper plumage olive-brown; in front of the eye bright yellow; chin and throat yellowish, with conspicuous black shafts; lower plumage fulvous-yellow, olivaceous on the flanks.

Bill bluish-plumbeous above and fleshy below; iris golden-brown or red-brown; legs fleshy-brown.

Distribution and habits.—O'Donel considered it "very common throughout the district"; this is most unlikely as it is not a plains bird though it *may* be found above Baksa in the winter. A number of specimens of the very similar species described next, have been collected, and I am inclined to believe that O'Donel's birds were wrongly identified. It is a bird of scrub, bamboo jungle and undergrowth and goes about in small flocks from bush to bush. It is insectivorous and occasionally utters a soft, low whistle.

40. The Assam Red-fronted Babbler.

Stachyris (Stachyridopsis) rufifrons ambigua (Harington).

(Fauna Br. Ind. 2nd Ed., No. 280).

Description.—I will only give the differences between this species and the last as they are very much alike. It differs in having the rufous on the top of the head much duller and *not* reaching the nape, but confined to the anterior crown; it has *conspicuous* black shaft-streaks on the crown and nape, whereas in the last species there are only some obsolete ones on the forehead; the throat is whitish and the lower plumage tawny-buff.

Bill slaty-blue; iris reddish-brown; legs yellowish-brown.

Distribution and habits.—A number of specimens of this little Babbler were collected at Hasimara, Hantapara, Nangdala and the Rehti forest. It is a bird of much lower levels than the last one, extending well into the plains. It goes about in considerable numbers, frequenting scrub-jungle, light deciduous jungle, bamboos and grassland.

41. The Assam Yellow-breasted Babbler.

Mixornis gularis rubricapilla (Tickell).

(Fauna Br. Ind. 2nd Ed., No. 283).

Description.—Length nearly 6 inches; Sexes alike. Extreme point of forehead, in front of the eye, eyebrow and whole lower plumage yellow; crown dull ferruginous blending into the olive-green of the upper plumage; the chin, throat and upper breast have some black shaft-streaks.

Bill blackish above, slaty-blue below; iris pale yellow; legs brownish-fleshy.

Distribution and habits.—A very common bird in the plains going about in parties or flocks in bamboos, bushes and lower trees. It is not shy, but unobtrusive and may often be seen in mixed hunting parties of other small birds. Harington described its note as a monotonous *chuk* constantly repeated. It is wholly insectivorous.

There is no information as to whether it breeds in the district or not. The breeding season elsewhere is from April to June, and it makes a rough, domed nest of bamboo leaves or broad grass-blades, lined with fine grass and fine roots, which it places in a bamboo-clump, or bush, from one to four feet from the ground. The eggs, 3 or 4 in number, are china-white, speckled and blotched with red or reddish-brown, the markings generally more numerous at the thick end forming a ring there, but sometimes scattered all over the surface. They measure about 0.68 by 0.5 inches.

42. The Nepal White-eyed Quaker-Babbler.

Alcippe nepalensis nepalensis (Hodgson).

(Fauna Br. Ind. 2nd Ed., No. 286).

Description.—Length 5 inches. Sexes alike. Crown and nape ashy-brown; sides of head ashy with a very conspicuous ring of white feathers round the eye; a long, black eyebrow, narrow in front, but very broad behind; lower plumage pale buff.

Bill light plumbeous or livid brown; iris hazel-brown; legs pale fleshy.

This rather dull-coloured Babbler can be recognised by the conspicuous white ring round the eye with the black eyebrow above it.

Distribution and habits.—I came across a small party of this Babbler near Baksa Duar; they were hunting for insects in the undergrowth and I secured a specimen. It goes about in pairs, as well as in parties, and also joins other parties of small birds. It frequents bamboos, low trees in forest and bushes, and is not a shy bird. It is very active in its movements, keeping up a chattering note most of the time.

43. The Assam Red-throated Tit-Babbler.

Schoeniparus (Alcippe) rufogularis rufogularis (Mandelli).

(Fauna Br. Ind. 2nd Ed., No. 300).

Description.—Length 5½ inches. Sexes alike. Top of head chestnut, bounded on each side by a black band reaching to the nape; in front of the eye, and an eyebrow, white; a broad, chestnut band across the throat; upper plumage olive-green; lower plumage white on the chin, throat, centre of breast and abdomen and olivaceous elsewhere.

Bill black; iris reddish-brown; legs fleshy-brown or yellowish-brown.

Mandelli's type specimen came from the Bhotan Duars and was obtained in January, 1873.

Distribution and habits.—Neither O'Donel nor myself have come across this bird. It is said to go about in parties of about six, haunting the forest and undergrowth and is rather restless, continually moving about in the cover. Stevens says that during the breeding season, in Assam, it is seen in pairs. It may turn up again, some day, in the hills or foothills.

(To be continued)

MORICULTURE

By

U. BHATTACHARYYA.

(Special officer, Silk, Directorate of Industries, West Bengal).

Cultivation of mulberry or Moriculture, as it is termed, constitutes the most important part of Sericulture. Mulberry is the only food of the Silk-worm (*Bombyx mori*). Investigations in different silk-growing countries in the world have been made trying to find out some other alternative but till now no tangible results have been achieved. It has been worked out that the food of silk-worms, *i.e.*, mulberry leaves, constitutes more than 50% of the cost of production of raw silk. The mulberry tree takes its name from the mulberries or fruits which it bears. Its scientific name is *Morus*.

For a long time Botanists placed the mulberry in the order Urticaceae but in the later years it was placed in the order Moraceae. C. V. Linné (1753) classified the genus *Morus* into five species for the first time. After that many scientists worked on this subject and Koidzumi (1917) classified them into 25 species of *Morus* and 12 species of an indistinct genus. According to Dr. Hotta, the present authority on the classification of *Morus*, whom I met in the course of my study tour in

Japan, there are at present in Japan 14 species, 68 cultivated varieties and 38 cultivated forms. In India we have many varieties of mulberry but no definite study of taxonomy has yet been done in this direction. Among the cultivated species *Morus indica* is very common. Many trees of the species *Morus laevigata,* which grow very big are seen in the Himalayan region but for feeding silk-worm the leaves of this variety are not considered to be suitable. Apart from these, plants belonging to the species *M. bombycis, M. acidosa, M. nigra* and *M. serrata* are also found in different regions of this vast subcontinent. Some of these have been imported from China and Japan. Mulberry is anemophilous; hybridization is actively carried on under natural conditions. So it is inferred that most of the current mulberry varieties have been made by hybridization to a great extent.

The mulberry varieties are generally diploid or those the number of chromosomes of which is $2n = 28$ but triploid and tetraploid varieties are also not rare. These latter varieties are generally the outcome of hybridization.

Soil and Climate.—The mulberry is a perennial plant. It may thrive for ten to twenty years or even for centuries, provided the tree is not subjected to annual pruning which is so disastrous that it kills even the healthiest trees. Some may suit the climate of one particular locality while others may not. There are wide differences in the adaptibility for the various meteorological conditions particularly temperature, according to the mulberry varieties. The mulberry is a native of tropical and temperate zones and hence only hardy varieties should be grown in colder regions. Mulberry trees generally more or less grow in all types of soil ; they are not very particular about the nature of the soil. Some varieties show more adaptibility for one type of soil than others. Some are deep-rooted, while the root systems of others are shallow. The best type of soil is deep, sandy loam. Flat, airy, and not too damp nor too dry soil is ideal for moriculture. The lands where water stands or where subterranean water level is very high, are most

suitable for the cultivation of mulberry. It has been proved after experiments that the proportion of the different elements representing the standard quantity of manure which gives the desired results for one acre of mulberry in a year is as follows:—

Nitrogen	...	...	198.0 lbs.
Phosphoric acid	...	...	99.2 lbs.
Potassium	...	...	145.6 lbs.

These amounts are recommended in order to obtain normally on an average 10,000 lbs. of mulberry leaves per acre per annum. The mulberry reacts badly in highly acidic soil. In order to counteract soil acidity, application of lime at a rate of about 1,000 lbs. per acre per year gives very beneficial results. This also facilitates the easy decomposition of compost. The best results are obtained if they are applied to mulberry fields in autumn or later. In the assimilating stage the nitrogenous manure gives the best results. The effects of phosphatic and potassium manure are influenced by soil conditions. In mountainous districts where acidic soil is dominant application of potassium and phosphatic manures is very effective. But these have less effect in alluvial soil as in river valley.

Propagation.—The methods of propagation of mulberry may be broadly classified into two :—Sexual propagation by seeds and asexual propagation by cutting, grafting, layering, etc.

Propagation by seeds.—(1) The seeds of mulberry are obtained by crushing mulberry fruits when perfectly ripe. But it is very difficult to preserve the seeds. These seeds generally die three or four months after gathering if left alone in an ordinary room. So special precaution is necessary if we want to sow them in the following spring. The best method for the preservation of seeds is to keep them under low temperature and in dry condition.

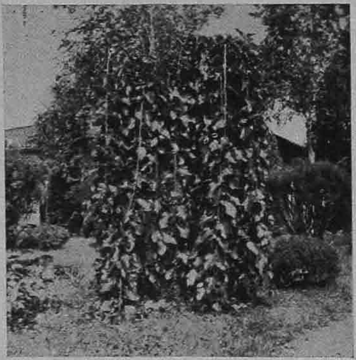
It has been seen that the seeds germinate best if they are properly sown and kept at 33°C — 36°C. It is better to cover the seed-bed with light straw and to keep sufficiently moist but watering must not be too much to cool the earth and paralyse the vegetation. At the end of the second year the saplings may be taken up to be transplanted in nursery gardens.

(2) The simplest method of propagation by means of cutting is universally practised in this country. Cuttings about nine inches long are gathered from the matured stalks of mulberry. Generally the middle part of the shoot that was formed in the previous year is used for the purpose. In a well manured field cuttings are placed on level land or in holes made by inserting a stick of the same diameter as the cutting. It is better to keep only an inch above the ground. In this system leaves may be obtained for feeding the silk-worm after six or seven months after plantation. The rooting ratio differs widely according to varieties. It is very difficult to propagate foreign varieties by cuttings as these do not take to rooting easily under normal conditions.

(3) Propagation by means of layering is very easy and cheap, but this method is not suitable when we want saplings on a commercial scale. There are various means of layering. In some cases ditches are dug out in radiation with mother stock as centre and mature shootlets are bent and covered with earth leaving only the tip above the ground. The shootlets develop roots underground while growing and give rise to new shoots which are cut off from the mother tree to make saplings.

(4) Grafting is also a very popular system of propagation. The main types of grafting are Bud grafting, Shoot grafting and Root grafting. Of these the last one is very easy and safe. In this method roots of about one year old seedlings of some particular variety are used as stocks for grafting with scions of other popular varieties. It is desirable to use as stock such varieties as are strong, have a great resistance to insect pests and are vigorous in rooting. The middle portion of the shoots

MULBERRY
DIFFERENT METHODS OF PRUNING.



1. Trailing type for decorative purpose.

2. Low bush type.

3. High bush or middling type.

4. Mulberry trees with intercrops.

are used as scions cutting away their top and bottom portions. Shoots from middling or high bush are better than those of ordinary bush plantation. After grafting many substances are interchanged between stocks and scions. Recent theory states that several years after root-grafting the roots from scions become very vigorous and roots from the stocks stop to grow comparatively. Grafting is generally done in spring before sprouting.

Pruning.—If the mulberry trees are allowed to grow freely without pruning they become very big in size, but the leaves become rough and small and also become susceptible to diseases. These big trees cause great inconvenience in plucking leaves for feeding the silk-worm. Generally three types of pruning systems are practised according to the necessity and convenience, namely, Low bush pruning, High bush or Middling pruning and Tree pruning.

(1) **Low bush.**—The best way for training the mulberry plants for low stem pruning or bush pruning is to allow about six to eight inches of the lower portion of the main stem above the level of the ground and the subsequent prunings are done above that point allowing each time about one to one and half inches of the lower portion of the branches so that after some years the upper portion may assume the form of a fist. The most suitable method of pruning as has been experimented in Japan is characterised by pruning close to the crown in the first year and then again pruning during the next year allowing about one to one and half feet above the ground and this is continued in every alternate year.

(2) **High bush or Middling.**—In this type the first pruning is made about one and half feet above the ground level and the subsequent prunings are made as described above. In this case also fists are formed after the lapse of a few years from the time of plantation.

(3) **Tree Mulberry.**—The saplings grow upto a height of six to eight feet when the branches are allowed to grow.

All the shoots that come out below that height are carefully removed. Harvesting of leaves is generally started in the fifth year of growth.

In warm countries like India the bush system is recommended. It is also desirable to grow the bush type of mulberry in areas where surface soil is shallow and the level of underground water is high. In cold places which are visited by snowfall, frost, flood or heavy rainfall, high bush or tree system is suitable. Trees and high bushes may be grown in the former places also in order to supplement the low bush plantation for better quality of leaves at a lower cost.

Comparison: Low bush system.— Advantages : Bush system is easily manageable, requires less time as shootlets grow early, yields more leaves, less damaged by insects or diseases.

Disadvantages: The leaves are of less food value, weak and susceptible to Tukra and dwarf diseases, soiled by rains and incapable of standing water-logging.

High bush system.—Advantages: Trees live long and yield good quality leaves with high food value ; catch crops can be grown as interculture, less affected by Tukra or dwarf diseases, the leaves contain less water and are very suitable for the growth of the silk-worms particularly in their later stages and the cost of production is less.

Disadvantages: Trunks are frequently affected by stem-borer insects, give less leaves, and it is necessary to wait for a long time before harvesting.

Tree system.—Trees may be grown along the edges of the paddy or vegetable fields, by the road sides or in a scattered way in a land kept reserved for other crops. The main advantages are that the cost of production is very negligible, the quality of leaves is very good and the leaves are less damaged by insects or diseases or other external factors. All types of intercroping can be freely practised. In cold regions which are annually visited by snowfall and frost, this system of plantation gives very good results.

The selection of a particular method of pruning depends upon the local conditions, *e.g.*, climate, soil, number of rearings in a year, quantity of silk-worm to be reared, etc. Further, the type of field determines the mulberry varieties to be grown and method of pruning to be adopted.

Method of plantation.—In a thoroughly cultivated and manured field, mulberry saplings are put into the soil very carefully with their roots carefully arranged. Compost, leaf mould or cowdung are very good manures for the nursery field. In warm plain districts, plantation is done in autumn, but in cold, mountainous districts, this may be done in spring also.

Low bush and high bush types of the mulberry are grown in continuous rows, the former being one and half to two feet apart, while the latter are from three to four feet apart. The tree mulberries are grown twelve feet apart, so that about 300 trees are contained in one acre.

The approximate cost of production of one acre of the mulberry plant is shown below:—

	Non-recurring			*Recurring*			*Outturn of leaves per annum with twigs*
	1			2			3
	Rs.	As.	P.	Rs.	As.	P.	
Bush (low) ...	350	0	0	400	0	0	200 mds.
Bush (high) ...	350	0	0	300	0	0	150 mds.
Trees ...	250	0	0	150	0	0	100 mds.

Diseases of Mulberry.—There are various types of insect pests and fungus diseases which cause harm to the mulberry trees. "Tukra" disease which is considered to be a virus disease causes heavy damage to the mulberry leaves especially in West Bengal, almost every year. If resistant varieties are grown which can adapt themselves to particular conditions of temperature, rainfall, etc., then the prevalence of diseases may be checked.

Utilization of Mulberry.—Mulberry is a multipurpose plant. Each and every part of the tree can be made use of in some way or other. It is mostly cultivated for the purpose of feeding silk-worms in the silk-producing countries of the world, *e.g.*, Japan, China, Russia, India, Italy and France. In Japan alone about 4,50,000 acres of land are utilised for Moriculture. This constitutes about 3.5% of the total arable land area of Japan. In India there are four major states whose mulberry acreages and the number of families engaged in this work are shown below :—

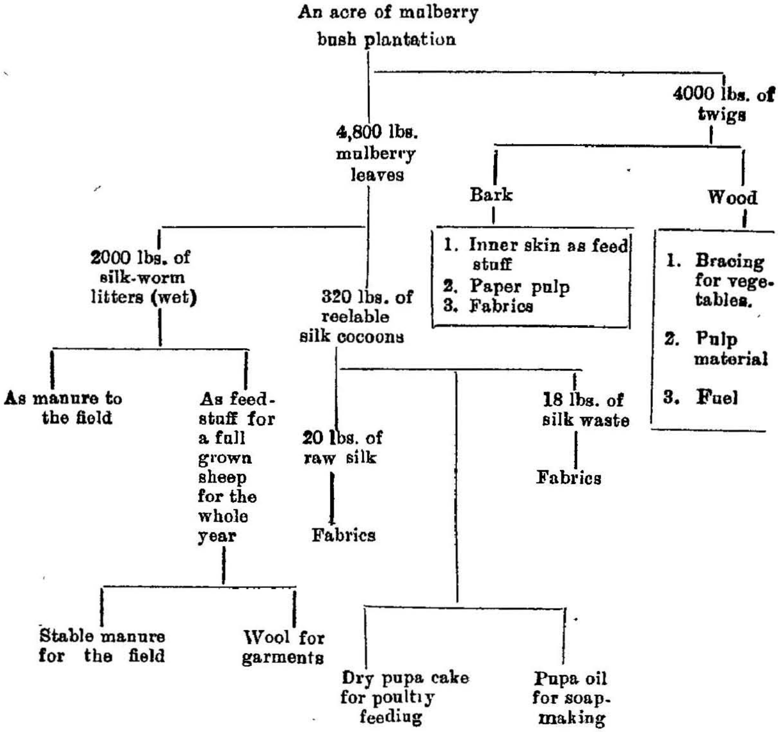
	Name of States	Acreage under Moriculture	Number of families engaged.
	1	2	3
(1)	Mysore	80,000	51,000
(2)	West Bengal	15,000	20,000
(3)	Madras	21,500	11,000
(4)	Kashmir	*	50,000

*There are innumerable mulberry trees growing wild in forests and also along the canals and roadsides.

Besides these almost all the states in India have more or less a few acres of mulberry fields on which a number of families depend.

For feeding silk-worms mulberry leaves are used. The refuse obtained after feeding silk-worms makes very good material for compost for manuring the fields, and further this can be utilised as food for the domestic animals. Glucocide, a medicine prepared out of the mulberry roots in Japan, is considered to be effective in reducing high blood pressure. Mulberry bark may be utilised for making paper along with paper mulberry barks. Mulberry wood is a very good material for the manufacture of plastics and sports goods, particularly hockey sticks, etc. The unsuitable parts may serve the purpose of fuel. Mulberry is also grown by the people of the hill region for using the leaves as fodder for their domestic animals. Mulberry fruits when ripe are very tasty and a delicious jelly is prepared from these fruits. In America, mulberry of a particular variety of a trailing type is grown for decorating the flower gardens.

Products from one acre of mulberry field



PROSPECTS OF BEEKEEPING AT TAKDAH AND THE DARJEELING HILLS ON A COMMERCIAL BASIS

By

J. R. JOHNSON

Chairman, Takdah Multi-purpose Co-operative Society Ltd.

1. GENERAL.

My first article under the above heading was published in this Journal in Vol. XXV, No. 2 of December, 1951. On being requested to write something further on the subject I am doing so and trust that it will be appreciated both by readers of the Journal and those in authority who could help towards establishing Apiculture in the District.

The only comment on my previous article in the Journal was made by Mr. Chas. M. Inglis, F.Z.S., C.M.B.O.U., who seemed to doubt the productivity of *Apis indica* (Hill variety) and referred to a 1915 Pusa Agricultural Research Institute report on the subject of honey yields by the Indian Bee. This article is alleged to have placed the yield at about 6 lbs. As will be seen below in paragraph 3 (Honey Yields) I trust that I have been able to convince Mr. Inglis that Mr. C. C. Ghosh must have based his conclusions after observing the work of these bees under primitive hive conditions and not when boxed in modern hives.

Dr. R. N. Muttoo, Honorary Deputy Director, Apiculture, Uttar Pradesh, who is also Honorary Secretary of the All-India Beekeepers' Association and also Honorary Editor of the Indian Bee Journal, to whom I sent a copy of my previous article commented as follows :—

"No 52/1033 dated 13-3-52 : Many thanks for your letter of the 5th and the copy of your scheme. I congratulate you on the interest you are taking in this much neglected and little appreciated industry in India. With enthusiastic workers like you the scheme should be a wonderful success. Had Dr. Katju still been Governor of West Bengal, he would, I feel

sure, have done something for this industry. He is very much interested and as Minister in the U.P., in 1938, he had a lot to do with the establishing and running of the Jeolicote Beekeeping Station. I think the scheme is good. Its success will depend upon the type of workers you can get."

In the Editorial of the Indian Bee Journal, Vol. XV, for March-April, 1953, the Editor makes the following comment:—

"At last, for the first time in India, the responsible Head of the Government (Department of Agriculture) has committed his Government and himself personally, to give to the Beekeeping Industry every possible assistance." This remarkable event happened on the 4th March, 1953, at New Delhi, when the Honourable Dr. Panjabrao Deshmukh, Minister of Agriculture, inaugurated "The Indian Council of Beekeeping."

The following was also published in the Indian Bee Journal :—

"9 (XXIV) Beekeeping and the National Plan : The intensive development of beekeeping is proposed in selected areas in states, in which the industry has already made some progress, for instance, Madras, Bombay, Uttar Pradesh, Punjab, Mysore, Travancore-Cochin and Coorg. In each selected area, there may be a sub-station serving a group of 20 to 30 villages. The scheme provides for the training of staff and beekeepers and for supply, at subsidised rates, of bee hives and other appliances. Co-operatives of bee-keepers are envisaged in each sub-station for collecting and marketing of the honey produced by members."

When inaugurating the Indian Council of Beekeeping at New Delhi on 4th March, 1953, Dr. Panjabrao Deshmukh, Minister of Agriculture, Government of India, in the concluding portion of his speech stated the following :—

"On the evidence at hand the future of beekeeping in India appears to be fairly bright. We have a large

home market for honey, the demand for which is steadily increasing. To meet this demand, large quantities of honey are being imported annually from abroad. This can be replaced by honey produced in India by modern methods. Honey that is being produced by the old methods is not finding a ready market because of the impurities which it contains.

At present pure honey is difficult to obtain. Once the public comes to realise that our honey is as good as the foreign article, its sale will increase. India is admittedly suited to the practice of beekeeping because of its rich flora and suitable climate. Experience gained so far shows that beekeeping is a profitable business for a small holder who is in need of additional income and requires his leisure time to be put to some good purpose. School masters, the educated unemployed, village headmen, clergymen, retired government officials, retired businessmen can also take up this industry. They will find much in this industry, that is fascinating, instructive and financially profitable."

In the same speech the Minister also states the following :—

"Unfortunately many organisations show enthusiasm in the beginning but for some reason or other the interests of the main supporters lag and then the organisation becomes lifeless. I hope, therefore, that I be forgiven for uttering this word of caution at the very outset. As I attach considerable importance to this industry, I shall always take the utmost interest in its progress and render it individually and as a Minister, every possible assistance.

"I only hope that the Council will be in a position to utilise it to the utmost and carry this torch for the addition of our foodstuffs and improvement in our nutritive food by spreading the organisation through-

out the country. I have great pleasure in inaugurating the Indian Council of Beekeeping and wish it every success."

I have introduced the above extracts in this article as from them it would appear that the ideas on beekeeping on a cottage or industrial basis expressed by me in 1951 are in agreement with the views of the Minister in charge of Agriculture, Government of India, in 1953.

As planned under heading 9 (XXIV) of the National Plan at least one sub-station seems essential in this District. At present Sri B. Raha has an experimental station at Kalimpong and is working under the State Government. I would suggest that this be turned into a sub-station as envisaged under the National Plan but he requires a few workers and his headquarters should be located in a more suitable locality such as Takdah where he would be of great assistance to the Co-operative scheme and be in a locality where there appears to be plenty of nectar-producing flora.

Kalimpong town, in my humble opinion, is unsuitable as there is not sufficient flora within the ordinary orbit of a foraging bee, *i.e.*, a radius of at most two miles.

So far this Co-operative has received from the Government of West Bengal in the Co-operative Department a sum of Rs. 1000/- towards implementing its bee scheme. We are thankful for this mite, but nothing really progressive and rapid can be done with such an amount. A start has, however, been made and by the end of this year we expect to have perhaps twentyfive members to whom hives have been supplied.

2, PROGRESS OF BEEKEEPING IN THE DISTRICT.

A far as I have been able to ascertain, in a small way, there are the following who have started but I am certain that there must be others with whom I have not got into contact. These persons keep bees under modern conditions but there are hundreds of villagers who have them under primitive condi-

tions as they cannot afford the cost of the modern hive and appliances.

(1) Mr. J. MacDonald, Moonsong, Kalimpong.
(2) Mr. A. Frizelle, Mangpoo.
(3) Revd. B. Stolke, Kalimpong.
(4) Sri B. Raha, Kalimpong.
(5) Revd. A. Schyrr, Pedong, Kalimpong.
(6) Revd. G. Rouillier, Suruk, Kalimpong.
(7) Br. B. Drobnic, St. Joseph's College, Darjeeling.
(8) Sri Budhir Bahadur, Botanical Gardens, Darjeeling.
(9) The Superintendent, Darjeeling Jail.
(10) Sri M. C. Mukia, Ghoom.
(11) Sri M. B. Pakring, Namring T. E.
(12) Sri Gokul Das Chettri, Mondal, Pumong Khas Mahal.
(13) Mr. D. Kirby, Gielle T. E.
(14) Mr. G. T. Kenay, Takdah T. E.
(15) The Takdah Co-operative Society.
(16) Mr. J. R. Johnson.
(17) Sri Joshbahadur Rai, Takdah Cantonment.
(18) Sri Manekumar Rai, Lingding Khas Mahal.
(19) Some members of the Takdah Co-operative.

The above list, though incomplete, does prove that there are quite a number of beekeepers in the District, who would, I am sure, welcome some large scale effort in beekeeping as contemplated under Item 9 (XXIV) of the National Plan.

When I meet beekeepers there are always discussions and below I am listing some of the more important subjects which crop up.

(1) Honey yields and how to increase them.
(2) Seasons of honey flow and what are the nectar-producing flora available.
(3) What are the best localities for beekeeping in the district.
(4) Improvement of species, especially Queen Bees.
(5) The most suitable size of bee hives.

(6) Swarm control.

(7) Some organisation for the collection of data regarding nectar-producing flora and the localities where found, and the periods of flowering of the various species.

(8) The formation of an Association whereby beekeeping could be placed on an organised basis both from a productive as well as protective basis.

From all this one cannot but conclude that there are a number of bee-minded persons in the District and coupled with the large number of bees available, that the field is ready for taking up the project as indicated by Dr. Panjabrao Deshmukh, Minister of Agriculture, Government of India. What obviously seems indicated is that there should be a lead given by the State Government so that the necessary organisation can be formed and steps taken to build up the industry.

3. HONEY YIELDS.

Personally I still maintain that with proper knowledge of these bees and careful management it is quite possible to average 20 lbs. of surplus honey per hive per year. Mr. A. Frizelle informs me that his best return has been 36 lbs. from one hive when he was at Latpanchar, Kurseong. Mr. J. MacDonald states that his best return has been 34 lbs. My own best has so far been 24 lbs. but I have more than once taken 10 lbs. from one hive during a single honey flow. On 28th June, 1953, during a visit to Mr. J. MacDonald at Moonsong I saw 11 super frames of 4 inches' depth full of capped honey and the bees were busy filling the remaining frames. Allowing a moderate 2 lbs. per super frame there were already 22 lbs. of honey surplus. This is a single honey flow and there are two main flows in a year. I trust that I have been able to convince Mr. Inglis that our bees, at least in the Darjeeling Hills, are capable of producing 20 lbs. of surplus honey in a year.

4. SEASONS OF HONEY FLOW.

As regards correct seasons of honey flow in the various parts of the District, the nectar-producing flora, and a correct

tabulation of these essential details in beekeeping, the most qualified, and in my humble opinion, the most favourably situated are the Forest Department in this District. If only the Forest Directorate could be induced to take up modern beekeeping in the District all beekeepers would have a valuable and reliable source technically qualified to tabulate such statistics.

5. IMPROVEMENT OF SPECIES.

Local improvement of species with a consequent increase in honey yields can be done with success by breeding from selected queens which are known to be good layers of eggs. Both Mr. J. MacDonald and myself have found from practical experience that bee colonies vary conspicuously in the egg-laying capacity of the queen bees. If therefore queen bees are reared from selected colonies it is evident that we are going to get a better strain in time. Mr. MacDonald has also demonstrated to me that the raising of selected queen bees is not a very difficult matter. One or two queen-raising centres would be all that is required to supply the needs of beekeepers. We have also established the fact that colonies can be brought up to strength by re-queening frequently, and thus ensuring that the colony has a young queen at the height of her egg-laying capacity.

6. HIVE STANDARDS.

Every beekeeper seems to have his own ideas as regards this point. I also started with an open mind and experimented with various sizes of hives and soon discovered that our bees would increase greatly if given sufficient space. I was also influenced by Mr. Langdale-Smith of Rangli-Rangliot T.E. who had been keeping bees for very many years. His hives were British Standard having brood frames of a comb capacity of 13½ by 8 inches and Supers 13½ by 4 inches. I have found from experience that these bees can cover 10 to 12 brood frames of this size. Next, by the use of one or two

division boards it is possible to have just sufficient brood frames in the hive as can be fully covered by the bees. As the colony increases in size more frames are added.

To the uninitiated who might enquire why it is essential to standardise I should like to point out that if all hives are standard, one beekeeper can help another. For instance, if nucleus hives are purchased it is essential that the frames be interchangeable as the nucleus is supplied after three or four frames are fully covered and the queen mated and laying.

Occasionally, neighbouring beekeepers can assist one another by supplying a brood frame with fresh eggs to a queenless hive and thus enable the queenless hive's bees to raise another queen and so save themselves from extinction.

The next question is the number of brood frames in a hive. The average bee colony can easily cover 9 to 10 frames and the extra good ones up to even 12 frames. So it is advisable to be prepared and have all boxes capable of taking 12 frames and with the help of one or two division boards keep the hive as small as required with the chance of adding frames when necessary.

I have found from experience that in small hives with no arrangement for automatic expansion there is a tendency for the bees to immediately start rearing queens and swarming. Not to have division boards and to fill up with all brood frames to the hives's capacity leaves some frames uncovered by bees and this at once encourages the wax moth. This, if uncontrolled, will soon cause untold damage in the colony.

Therefore, in the light of my own experience and from the views expressed by an old and experienced beekeeper like Mr. Langdale-Smith, I would recommend the standardisation of the British Standard hive with 10 to 12 frames of comb space of 13½ by 8 inches and super frames of 13½ by 4 inches with one or two division boards.

(To be continued).

BUTTERFLY-COLLECTING AS A HOBBY.

By

S. Thomas Satyamurti, M.A., F.Z.S.

Butterfly-collecting is an absorbing scientific pastime which provides one with plenty of profitable recreation in one's leisure hours. With moderate care and skill, the trouble one takes in collecting and preserving butterflies will be amply rewarded, and in due course the proud possession of a good collection will enhance one's interest in this pleasurable hobby. The gorgeous splendour of colour and design displayed by so many of our butterflies can hardly fail to serve as an irresistable incentive to the beginner in this healthy pursuit; and incidentally a knowledge of the methods of collecting and preserving butterflies will prove to be of great value in enabling our readers to make contributions of butterflies collected in their respective localities to our Museum.

As a rule, flower gardens and grassy fields and meadows are the favourite haunts of butterflies ; but if one wishes to collect the rarer and more attractive types, one should venture into the jungle. Many butterflies may be bagged by beating bushes especially when they have a lot of flowers on. Banks of small streams and creaks are also sometimes rich in butterflies, while many of the larger and more brightly coloured species are found only up the slopes or on the tops of hills.

A butterfly net is an indispensable aid to the butterfly-collector. The best form of net is the one shown in the sketch. A ring made of hollow brass supports a net of some soft material such as mosquito-netting or mull. The ring is connected to a straight, hollow, brass handle by means of a small Y-shaped joint. It is always advisable to carry a spare net cloth as the original net may get torn especially while collecting among thorny bushes. The net cloth is generally green in colour, but the colour has no special significance.

Catching butterflies with a net requires some practice. A rapid lateral sweep of the net followed instantly by a dextrous twist of the wrist, throwing the net folded over the frame, is

probably the most satisfactory method. But one should be careful not to get the net torn into bits by thorns while sweeping it for a catch. For butterflies which sit tight on the ground, the best method is to flop the net over the butterfly and hold up the net vertically over it. The butterfly readily flies up to the top, and the net may then be twisted rapidly as before. It is always safer to catch a large butterfly while it is at rest, than when it is flying fast; it is therefore advisable to chase a flying butterfly until it comes to rest somewhere, when it can be easily picked off with the net without the slightest damage.

The next step is to kill the butterfly. A popular method is to pinch the butterfly at its thorax when the wings are held folded over the body. But if you wish to be more sympathetic you may use a killing bottle. This is just an ordinary bottle with a very wide mouth and an air-tight lid, filled at the bottom to a depth of about an inch and a half with a compact mass made up of potassium cyanide and bits of tissue paper, well compressed. This layer of cyanide is covered over with two or three circular pieces of blotting paper. This killing bottle should be carefully labelled 'poison' and kept under lock and key when not in use. If cyanide is not available, a wide-mouthed bottle with a false perforated bottom made of wire gauze, in which cotton wool soaked in chloroform is placed in the space below this false bottom, may be used as a substitute. But the chloroform has to be constantly renewed as it easily evaporates. The killing bottle should be carried about by the collector in the field and the butterflies should be dropped into the bottle directly they are caught in the net.

After a butterfly has been killed, its further treatment depends on whether the collector intends to set it out the same day, or some time later on at his leisure. A butterfly that has become rigid owing to rigour mortis may of course be relaxed and set at leisure, but whenever it can be helped, it is always more satisfactory to have them pinned out in position while they are yet fresh and flexible. If the collector decides to set the butterflies during the course of the same day, he should remove them from the killing bottle and pin them temporarily inside

a small cork-lined box, the top of which is kept slightly moist. If, on the other hand, he desires not to set it immediately, it should be placed unpinned with its wings folded over its back, in a small, triangular paper envelope; this is made by cutting out a rectangular piece of paper and folding it diagonally so that one of the edges protrudes a little beyond the other at each of the two shorter margins as shown in the figure; these edges are then folded inwards in opposite directions so as to make a closed envelope. It would be helpful to carry a number of such envelopes in the pocket, but when they are filled they should be placed in a tin box to prevent them from being damaged by friction or pressure.

Well-constructed setting boards are required for "setting" or pinning out a butterfly to the best advantage. A setting board has a wooden base with a thick, flat layer of cork sheet over it, and bears along the middle a straight, longitudinal slot for the reception of the body of the butterfly. The width of the surface and of the slot vary in different boards according to the expanse of the butterfly's wings and the thickness of its body respectively. The depth of the slot is generally $\frac{1}{2}$ to $\frac{3}{4}$ inches. It is desirable that these boards are placed in a tight fitting setting box in which there is an arrangement by which both its top and bottom can hold firmly a close set row of these setting boards.

To set a freshly killed butterfly, it is first removed from the cork-lined box in which it had been pinned temporarily, and is pinned to the setting board, with the body fitting into the slot and the long central pin passing through the thorax. Care should be taken to see that the slot is wide enough just to accommodate the body easily, and no more. The wings are then bent down on either side, and are pulled forwards into proper position by means of a setting needle which is just an ordinary fine needle with a blob of sealing wax at the eye end. The feelers of the butterfly are then arranged into position, and if necessary, are fixed with fine pins. Having got the wings flat against the board and in their correct position, the wings are secured by passing narrow strips of clean paper over them and pinning the ends of the strips firmly by means of small

pins. It should be noted that the pins pass only through the paper strips near their tips and not through the wings of the butterfly. When the wings have been thus pinned out the butterfly should be allowed to remain on the board for a day or two, or, in the case of large ones, even for a week. But during this period it is important that the board should be kept well covered either in a setting box or in a cupboard to prevent damage by ants and small beetles. The strips of paper may then be removed and the butterfly taken off the setting board and transferred to the permanent cabinet or storing box, as the case may be, by means of the single central pin which passes through its body. The butterfly should thereafter be always manipulated only by means of this pin, and should never be handled directly.

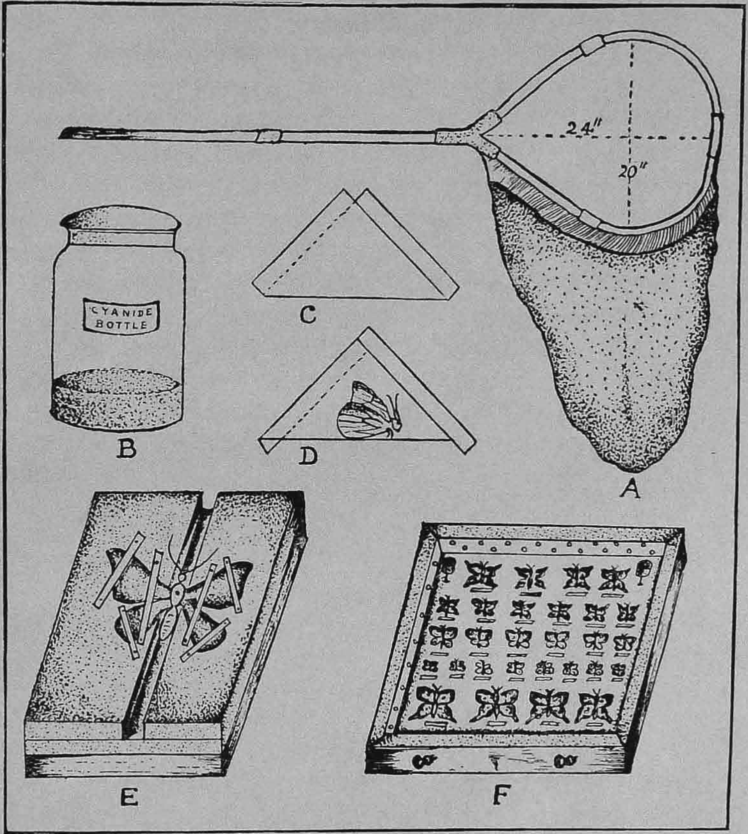
If the butterflies collected in the field have been placed in triangular paper envelopes and are required to be set some time later, it is necessary to relax them before setting them. To relax butterflies for setting, a relaxing bottle with a layer of moist sand at the bottom covered over by a few circular pieces of blotting paper may be used with advantage. The period taken for relaxing varies from two days to nearly a week, depending on the size of the butterfly. The butterflies must be left in the relaxing bottle until they are fully relaxed and the wings are easily movable. But they should never be left in the bottle longer than necessary as they readily rot and get mouldy. It is advisable to change the blotting paper every time a fresh set of butterflies are put in for relaxation. After they are completely relaxed the wings will no longer be stiff and rigid. They are then taken out and set as indicated above. For transporting butterflies, it is best to keep them unrelaxed and folded in the triangular paper envelopes and pack them in tin boxes. They can be taken out, relaxed and set at their destination. In the relaxing bottle, it is advisable to add a drop of carbolic acid solution to the moist sand, in order to prevent moulds.

When the butterflies have been set, it is essential that they should be stored very carefully as many hours of hard labour may become a wasteful mess by improper storage. For amateur

collectors, cork-lined boxes made of plywood measuring $17\frac{1}{2}'' \times 12'' \times 2''$, and provided with tightly fitting lids will prove satisfactory for storing the preserved butterflies. But, for institutions such as schools, colleges and museums, regular cabinets with a number of vertical rows of smoothly sliding, glass-topped, cork-lined drawers are perhaps ideal. These cabinets may be obtained from, or made to order by, dealers in entomological equipment. Care should be taken to see that the cabinet drawers as well as store boxes are provided with a narrow chamber or special cell all round along the four sides, and that this special chamber is always filled with powdered naphthalene. In addition to naphthalene, plugs of cotton wool soaked in a solution of camphor in concentrated lysol and mounted on long pins should be pinned at the four corners of the storing box or cabinet drawer to prevent the butterflies from getting rotten and moth-eaten.

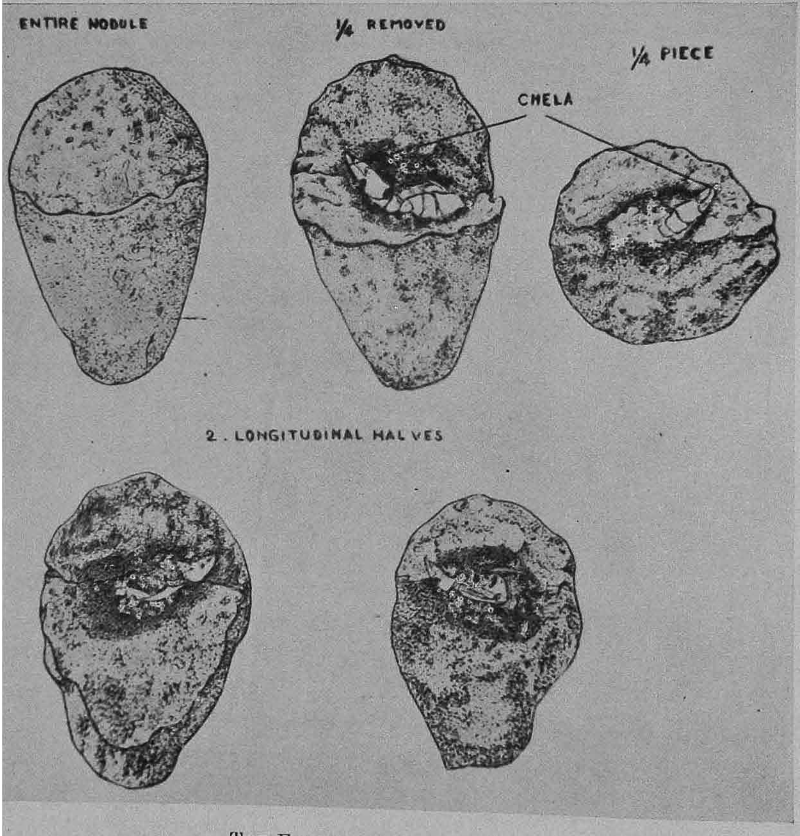
When there are enough butterflies to fill up a single drawer or storing box, they should be arranged in regular, evenly spaced rows, and each butterfly should have a small label on the pin below the body, bearing the date, locality, name of the collector, and, in the case of hill forms, the elevation at which it was captured. Gradually, as more specimens are collected, they should be sorted out and arranged in their proper systematic sequence. Naming the butterflies is a difficult task, and may be done later, with the help of a specialist, or by careful comparison with collections in a museum, or by reference to books and coloured sketches dealing with the identification of butterflies. Perhaps the best plan would be to adopt a combination of all the three methods. Butterflies exhibited in museums to the public, in glass show cases should be guarded from undue exposure to light, as they rapidly fade and become dull-coloured. Effective screening should therefore be adopted for the exhibited series of butterflies

A good collection of butterflies, apart from being scientifically vaulable, may also be profitably utilised by amateurs for decorative purposes. Large and brightly coloured butterflies



A. Butterfly net.
B. Cyanide killing bottle.
C. Rectangular piece of paper folded to make triangular envelope.
D. Completed paper envelope with the edges folded in, and showing the position of the butterfly inside.
E. Setting board with a butterfly set on it.
F. A single glass-topped drawer from a butterfly cabinet.

Note :—These figures have been drawn from actual objects in the Museum, and not reproduced from any book.



THE FOSSILISED DECAPOD CHELA.

such as swallow-tails, admirals, dukes, tiger-butterflies, etc., will make a particularly effective drawing room ornament if they are fancifully arranged and mounted in shallow, cork-lined boxes framed with a glass top by means of a neat narrow binding of calico or *passe-partout* all round; but care should be taken to see that there is a special, perforated chamber inside the box at its lower end, which should be filled with powdered naphthalene before the box is framed. When there are a large number of duplicates of small species such as the blues, they may be closely arranged in the form of attractive designs and framed as above. Mounting butterflies in various flying and sitting postures against a background of either real or painted twigs, leaves and flowers also produces a delightfully pleasing effect if skilfully executed.

A NOTE ON A FOSSILISED DECAPOD CHELA

By

P. K. Menon & S. M. Krishnan

(Assistant Professors, Presidency College, Madras)

When we were at Ariyalur with a party of Zoology Honours students of the Presidency College, Madras, Mr. S. Subramanyam, Field Geologist of the F.A.C.T. (Fertilisers and Chemicals, Travancore, Limited) drew our attention to the animal remains in a calcareous sandstone nodule which he had collected from the upper Uttattur group of the Trichinopoly Cretaceous sequence.

On examination by us it was found to be the fossilised anterior chelate leg of a Decapod Crustacean (see figures). The exoskeleton of the leg was white and fragile, and the muscles petrified and dark brown. The matrix round the Chela was much darker than the surrounding matrix probably due to the crushed original organic matter of the body or to some phosphatic mineral contents. Numerous instances of Chela referable to the genus *Thalassina* are on record from the same

horizon in other parts of the world. This genus and allied forms had the body except the front leg covered by thin cuticle. The absence of any remains of the body in the present case, though the Chela is well preserved, may be for the same reason.

The following details relating to the occurrence of this and similar nodules were furnished by Mr. S. Subramanyam of the F.A.C.T.:—

> This zone is several feet thick and composed of calcareous sandstone and shale of ferruginous and calcareous origin. Numerous calcareous concretions generally rounded or nodular, occasionally of fantastic shapes, varying from the size of a walnut to that of an apple are embedded in this shale. Many concretions are found to have no organic fragment as a core. The nodules crop up in very large numbers and the only intermediate layers are some rows of yellow calcareous shale, or less often, white or pink ferruginous shale. They are inclined at every possible angle. The clays contain the fossils of the Upper Uttattur group in moderate numbers. But the most peculiar fact is that these concretions have really occupied hollows in the original surface of the soil. They fill regular spherical depressions in the apex of cones as shown by numerous sections. It is by these enclosed layers of foreign rock substance that the dip and strike of this great mass of clays must be determined, because the clays themselves show little stratification. The nallah section shows the different bands of sandstone patches or boulders with an average thickness of three to four feet. But the stratification is always obscure and is usually obliterated not only by the secondary stratification but also by shearing and shattering. These divisions of the group present their distinctive mineral and Palaeontological characters as far south as the high grounds between the forks of Periammapalayan odias where they begin to blend into Trichy group; to the north even as far as Kunnam and Anthoor they are more prevalent in the upper part of the group and each zone is to a great extent characterised by

peculiar fossils. The section near the ravine where the nodule with the Decapod Chela was collected is very similar in character. It is due west of Kunnam village, *i.e.*, within a mile from Odhium village proper.

INFORMATION WANTED ON THE INDIAN RHINOCEROS

Tabulated by

E. P. GEE.

1. The Rhino's Horn.

(*a*) It is known that the Indian Rhino (*R. unicornis*) often uses its tushes (in its lower jaw) for attacking, fighting and biting. Does it also use its horn ? If so, does it use its horn at the first charge only, and then its tushes later ? Or when ?

(*b*) Does it use its horn for "rooting", *i.e.*, digging up roots, grasses, etc. ?

(*c*) Does it use its horn for steering its calf when the calf runs in front of the mother, as in the case of the African White Rhino ?

2. Rhino Mating and Fighting.

(*a*) It is known that bull rhino sometimes fight. Does this happen in the breeding season for the possession of a cow ? If so, in what months does it happen ?

(*b*) In what months of the year does the actual mating of rhino take place ?

(*c*) Where, and at what time of the day does it take place ?

(*d*) Do females ever fight ? Or a male with a female ?

(*e*) Do fights ever take place in dispute over "territory" ?

3. Rhino Breeding.

(*a*) It is believed that the period of gestation of rhino is 18½ or 19 months. Is this correct ?

(*b*) How does birth take place, lying down or how ?

(*c*) What happens to the afterbirth ?

(*d*) What time of the year are rhino calves born ?

(*e*) Does the newly born calf have a pinkish colour ? If so, for how long ?

(*f*) Are twins ever born ?

(*g*) Does the previous calf remain with the mother after a new calf is born ? If so, how big was the previous calf (height to shoulder) ? And how long does it remain ?

(*h*) How soon after the birth can the baby follow its mother ?

(*i*) Which goes first along the path, the baby or its mother ?

(*j*) If ever a newly born calf is found dead, it should be carefully measured, giving height at shoulder, length of body from tip of nose to root of tail, length of tail, and weight in pounds.

4. Rhino Dung Heaps.

(*a*) It is known that the rhino deposits its dung in heaps. Does each particular rhino have its own heap ?

(*b*) Or do rhino deposit at any heap that happens to be there, as they happen to pass by ?

(*c*) Do dung heaps denote "rhino territory" ?

5. Rhino Swimming.

(*a*) It is known that the Indian rhino can swim, but does it swim willingly and deliberately ?

(*b*) Or does it only swim when it is compelled to ?

6. Rhino and Birds.

(*a*) It is noted in Kaziranga that the jungle Mynah is the mynah seen on the backs of rhino looking for ticks, etc. and that egrets are also seen accompanying rhino. Is this confirmed by other observers ?

(*b*) Which kind of egret is found with rhino ?

(*c*) Do any other kinds of bird keep company with rhino ?

7. Rhino and other Animals.

(*a*) It is believed that tiger possibly avoid rhino, and are afraid of them. How do tiger react when they meet rhino, and vice versa ?

(*b*) Are wild elephants scared of rhino, as are domesticated ones ?

(*c*) Wild buffalo have occasionally been seen in close company with rhino. Is this confirmed ?

(*d*) Do deer of different kinds, swamp deer and hog deer, consort with rhino ?

(*e*) Are wild pig ever found in close company with rhino ?

(*f*) Do any other wild animals show friendship for or enmity against rhino ?

8. Rhino in Olden Times.

(*a*) It is recorded that in olden days rhino were kept by Princes and others, and used in battle against their enemies. This implies domestication and a great deal of training. Are there any detailed accounts of domestication and training of rhino, and of their use in war, etc. ? If so, how was it done, when, where and by whom ?

(*b*) In these old accounts, is there any information about the life history, etc., of rhino, such as is sought about their breeding, etc. ?

9. Noises made by Rhino.

(*a*) Grunts and whistling noises have been recorded (as well as roars when a rhino is trapped). Is the whistling noise made only in the mating season ?

(*b*) And by which sex is the whistling noise made ?

N.B. All observations made in the field should be strictly accurate, and not based on hearsay without varification, or coloured by imagination. Every report should contain the date, time of day, full name and status of the person(s) who made the observation, and names of any witnesses—especially if the event reported is noteworthy. It is suggested that, with the approval of the Conservator of Forests, all reports made by members of the Forest Staff should be sent through the usual channels to their respective D.F.O.'s, copy to Mr. E. P. Gee, Doyang T.E., Oating P.O., Assam, who will only be too pleased to compile all information thus received.

DOYANG T.E.,
OATING P.O.,
ASSAM.
April 24th, 1953.

E. P. GEE.

A CATALOGUE OF THE PLANTS OF SIKKIM HIMALAYA

By

B. N. Ghose.

This catalogue has been compiled mainly for the use of non-botanists, for use in the field and forests, who may find it difficult to determine the names of species of trees and plants they may come across for want of a handy volume on the plants of Sikkim Himalaya while botanising in this locality. This list is by no means complete. I hope future collectors of plants will add to the information herein given.

The arrangement of the orders, genera and species of the flowering plants is in accordance with that adopted by Hooker in the Flora of British India. Native names are given wherever possible. The Lepcha names are more or less dependable.

The figures in columns 4 and 5 stand for the months of the year; 3 would mean March, 4 April, and so on. 'L' in the last column stands for Lepcha, 'Bg.' for Bengali and 'P' for Parbatia names.

SIKKIM PLANTS

Order, Genus and Species	Habit of growth	Colour of Flower	Flowering season	Fruiting season	Locality	Elevation above sea level (in feet)	Himalaya Rainy or Dry	Distribution	Local name
1	2	3	4	5	6	7	8	9	10
Order I. RANUNCULACEAE Genus **CLEMATIS**									
C. napaulensis DC.	Evergreen slender climbing shrub	Creamy	11	1—3	Bagorah Labdah } Darjeeling }	5000 6000	Temperate	Gharwal to Bhotan	L. Tambam chilp Bg. Banmarich
C. montana Ham.	Deciduous woody shruby climber	White	6	11	Tongloo Phalut Rimbick Dickchu	10000 14000	Do.	Indus to Brahmaputra, Tibet	Do.
var. *tonglensis*	Do.	...	...	...	Tongloo	10000	Do.	—	...
var. *chumbica* and var. *proecox*	Do.	...	...	—	Phalut	12000	Do.	...	...
var. *intermedia*	Do.	...	...	...	Tongloo	10000	Do.	...	...
C. smilacifolia Wall.	Woody climber	Reddish	10—11	2	Sureil, edge of woods	4000	Subtropical	Sikkim to Philippines	...
C. Gouriana Roxb.	Extensive climber	Greenish or Pinkish	9—11	1	Pulbazar	2500	Do.	West Himalaya	...

C. vernayi C.E.C. Fisher	Climbing bush	Yellow	...	...	West of Gyantse	13000	Alpine	Tibet	...
C. puberula H. f. & T.	Climbing stem deeply grooved	Yellowish	...	...	...	14000	Tropical	Himalaya	...
C. zemuensis W.W. Smith	Do.	...	7	10	Lower Zemu	9000	Alpine Himalaya	Sikkim Tibet	...
C. orientalis Linn.	Woody climber	Yellow or mottled with purple	7—9	10	Gyantse and Kangma	14000	Open dry ground	Kumaon to Manchuria	...
C. orientalis var. *acutifolia* var. *obtusifolia* var. *latifolia*	Do.	Flowers large Flowers small Flowers middle-sized	...	...	...	...	Do.	...	...
C. tangutica Korsh	Small climbing shrub	Yellow	7—8	10	Gyantse	14000	Tibetan Himalaya	China	...

SIKKIM PLANTS

Order, Genus and Species 1	Habit of growth 2	Colour of Flower 3	Flowering season 4	Fruiting season 5	Locality 6	Elevation above sea level (in feet) 7	Himalaya Rainy or Dry 8	Distribution 9	Local name 10
Genus **CLEMATIS** (Contd.) *C. acuminata* DC.	Slender, branched glabrous climber	Yellow or mottled with purple	9—12	2	Sinchal Lachen	6000 9000	Temperate	Gharwal to Bhotan	P. Kapasi Lahara
var. *sikkimensis*	Leaflets larger	Flowers numerous	...	...	Assam Sikkim	5000 7000	...	Do.	...
var. *Hookeri* P.B.	Climber	...	...	...	...	4000 7000	...	...	...
C. connata DC.	Large woody climber	Reddish, many-flowered	8—11	11—12	Chumg-thang Lachen	5000 9000	Temperate	Kashmir to Sikkim	...
var. *sikkimensis*	...	...	11	...	...	...	...	...	...
C. Buchananiana DC.	Large woody climber	Cream	11	2	Rungbi, Birch hill	6000 7000	Temperate	Himalaya and Patkoi	...

var. *rugosa* (underside of leaves whitish)	Do. Leaves rugose	...	...	2	Sureil	6000	...	...	...
var. *vitifolia* (with thin leaves)	Do.	...	...	...	...	...	...	...	...
var. *tortuosa*	Do. Leaves glabrous veins silky	...	...	2	Sureil	6000	...	...	...
C. *grewioeflora* DC.	Woody climber	...	3—10	12—4	Mangpu	3000 to 5000	Temperate and Subtropical	Kumaon to Bhotan	P. Kapasi Lahara ...
C. *Roxburghiana* D. Juss	Do.	...	9	...	...	4000	...	Sikkim	...
Genus **NARAVELIA** N. *zeylanica* DC.	Climber shrub	Yellowish white	6—7	3—10	Kalijhora Terai	3000	Tropical	Nepal Bengal Java	Bg. Chagalbati

SIKKIM PLANTS

Order, Genus and Species	Habit of growth	Colour of Flower	Flowering season	Fruiting season	Locality	Elevation above sea level (in feet)	Himalaya Rainy or Dry	Distribution	Local name
1	2	3	4	5	6	7	8	9	10
Genus **ANEMONE** *A. rupicola* Camb.	Hirsute perennial herb, softly silky	White	7	10	Changu Alpine valleys	14000	Alpine	Kashmir to Sikkim	...
var. *sericea* var. *glabriuscula*	Leaves coarsely toothed Glabrous	...	...	...	...	...	Do.	Do.	...
A. vitifolia Ham.	Stout branched herb	White	8—9	9—11	Lachung Darjeel-ing	5000 9000	Temperate	Sikkim eastward	...
A. Griffithii H.f. & T.	Small herb perennial	White or Pinkish	5	8	Changu	12000	Alpine Himalaya	East Himalaya	...
A. rupestris Wall	Like a small *A. obtusi-loba*	Golden yellow	7	...	Chumbi Magu Changu	14000 14000 12000—13000	Do.	Alpine Kashmir to Hazara	...

A. trullifolia H.f. & T.	Densely villous herb	Golden yellow	5—6	...	Changu	11000—15000	Alpine	Eastward to Bhotan	...
A. rivularis Ham.	Branched tall herb	White	5—6	9-10-11	Changu Lachung	13000 9000	Temperate	India and Ceylon	...
A. obtusiloba Don Prodr.	Densely tufted herb	Variable in colour, Pink, white, red, yellow, violet, blue	6—9	9—10	Tongloo Phalut Changu	12000 11000—14000	...	Kashmir to Sikkim	...
var. *glabra*	Glabrous herb	Golden	...	...	...	...	...	...	...
A. demissa H.f. & T.	Softly hairy herb	White or bluish white	7	...	Gaigong Changu	15000	Alpine Sikkim	Sikkim	...
var. *umbellata*	...	...	...	...	...	13500	...	...	...

SIKKIM PLANTS

Order, Genus and Species 1	Habit of growth 2	Colour of flower 3	Flowering season 4	Fruiting season 5	Locality 6	Elevation above sea level (in feet) 7	Himalaya Rainy or Dry 8	Distribution 9	Local name 10
A. demissa var. *villossissima*	...	...	...	...	Sangalila Jongri Sikkim	13000	...	...	...
var. *monantha*	...	...	...	...	Tankrala	13000	...	...	...
A. polyanthes Don Prodr.	Erect woody herb	White in umbel variable	5—7	9	Jongu	14000	...	Kashmir to Sikkim	...
				11	Changu	...	...	...	...
var. *hirsuta*	Do.	...	...	9	Gousar	...	...	...	...
A. elongata Don Prodr.	Small herb	White	...	...	Temperate Himalaya	10000	Temperate	Nepal to Khasia	...
A. callianthemum cachemerianum Camb.	Herb	Pink	5—8	...	Thangu	15000	Alpine	Inner ranges of Himalaya	...
A. adonis chrysocyanthus H. f. & T.	6" plant	Golden yellow	...	12	Yamtso La	Do.	Do.	Do	...

Genus **THALICTRUM**									
T. elegans Wall.	Perennial herb	Green, purple or white	...	9-10	East of Thangu	14000	Subalpine Himalaya	Hazara Sikkim	...
					Lachen	8000			
					Jongri	14000	Do.	...	...
		Brick red	...	...	Gyantse	14000			
T. platycarpum H. f. & T.	Do.	Greenish	8	9	Tuna	15000	Do.	...	...
				10	Gyantse	14000	Do.	...	...
T. cultratum Wall.	...	Greenish white	...	9	Phari	12000 to 16000	...	Kashmir to Sikkim	...
var. *tsangense*	...	...	...	9/10	Zemu valley	12000	...	...	...
					Langmachu	14000	...	...	...

SIKKIM PLANTS

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1	2	3	4	5	6	7	8	9	10
Genus **THALICTRUM** (Contd.)									
T. chelidonii DC.	Much-branched herb	Red or deep purple	8	10	Talung Samdong Sibu Valley	8000—12000 10000	Temperate	Kulu Sikkim	...
Do.	Do.	Do.	7	10	Tonglu forests Singlila Chumbi	13000	...	...	...
T. reniforme Wall.	Do.	Sepals very deciduous	...	...	Temperate Himalaya	8000—10000	Temperate	...	...
T. virgatum H.f. & T.	Glabrous herb	Small white	7—9	10	Lachen	7500	...	Inner valleys Sikkim	...
					Karpang	12000	...	...	...
T. rostellatum H.f. & T.	...	White	...	...	Temperate Himalaya Lachung Chumbi	7000 11000 8500	Temperate	...	...
	...	...	7	...					

T. alpinum Linn.	Small slender tufted herb	Greenish red	...	...	Chorten Nimala Nakachu valley	16500 16—17000	Alpine Himalaya	...	...
T. rutaefolium H.f. & T.	Week straggling shrub	Greenish	...	...	Sikkim	12000	...	...	...
T. saniculaeforme DC.	...	White	7	9—10	Temperate Himalaya Below Lachen	8000 7000	Temperate	...	...
T. javanicum Blume	Erect glabrous herb	White	...	...	Temperate Himalaya Phadonchen Chuabha-jang	... 8000 12000	Temperate ...	Simla to Sikklm ...	... ...
T. foliolosum DC.	Glabrous herb	White, pale green, or dingy purple	... 7 6	... ...	Temperate Himalaya Lacheng Lantong	5000—8000 ...	Temperate ...	Assam to Burma	...
T. sp. Specimens much resembling *T. alpinum* Linn.	...	...	...	10	Chumgthang	5000	...	...	...

SIKKIM PLANTS

Order, Genus and Species 1	Habit of Growth 2	Colour of flower 3	Flowering season 4	Fruiting season 5	Locality 6	Elevation above sea level (in feet) 7	Himalaya Rainy or Dry 8	Distribution 9	Local name 10
Genus **RANUNCULUS** *R. pulchellus* C.A. Mey	Herb	Yellow	9	...	Lachung Jongri Khambajing	5000 18000 14000	Alpine Himalaya	Siberia Mongolia	...
var. *longicaulis* var. *typicus*	...	...	7	...	Lonak Chota Nima La	14500 17000	Alpine Himalaya	...	...
var. *sericeus*	Leaves densely silky	...	10	...	Nakachu	16000	Do.	Do.	...
R. lobatus Jacq.	Decumbent glabrous herb	...	7	...	Donkia	12000—16000 16000—18000	Alpine Himalaya	West Tibet	...
R. hyperboreus Roxb.	Stoloniferous herb terrestrial or floating	...	7	...	Nathula Chola	15000 15000	Do	Sikkim Kashmir	...
R. affinis Br.	Erect or diffuse herb	Yellow	6—7	...	Jongri Zemu	16000	Temperate and Alpine Himalaya	Sikkim to Baltistan	...

R. hirtellus Royle	Erect or decumbent pubescent herb	Yellow	7	9	Changu Laghep	11000 - 12000	Temperate or Sub-Alpine	West Himalaya	...
R. nivalis Linn.	Small shaggy herb	...	...	...	Tankra La	16000	Alpine Himalaya	Arctic region	...
R. diffusus DC.	Diffuse or prostrate perennial hairy herb	Golden Yellow	3—4	10	Sinchal Tanglu Karponang	8000 10000	Temperate Himalaya	Chenab to Java	...
R. loetus Wall.	Woody root stock appressedly hairy herb	...	5	...	Sikkim Rangpo Rinchiging	...	Sub-Tropical	West Tibet	...
R. sceleratus Linn.	Annual erect glabrous herb	...	2	...	Tista Sevoke	Plains	Warm valleys	River Banks in Bengal Narbada	...
R. flaccidus H.f. & T.	Annual in dense patches appressed to the ground	...	5—7	...	Changu Zemu Tonglu	10000 12000 10000	Alpine and Sub-Alpine	Kumaon to Bhotan	...

SIKKIM PLANTS

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Genus **RANUNCULUS** (Contd.) *R. aquatilis* Linn.	Aquatic herb	White	7	...	Chumbi	14000	Alpine	...	...
var. *trichophyllus*	Do.	White	7	...	Lonak	15500	...	...	...
R. cymbalariae Pursh.	Creeping glabrous herb	...	5—8	8—9	Changu Lonak Tonglu	9000	Sub-Alpine	...	...
Genus **OXYGRAPHIS** *O. glacialis* Bunge	Dwarf herb	Yellow	7	8	Jongri	16000	Alpine Sikkim	Manchuria to Siberia	...
O. polypetala H. f. & T.	Herb	Yellow	5—7	7—9	Changu Gnathong	12000	Inner Alpine	Tibetan Himalaya	...
Genus **PAROXYGRAPHIS** *P. sikkimensis* W.W. Smith	Herb	...	7	...	Changu Jongri	12000 to 14000	Damp Ranges	...	...

Genus **CALTHA** *C. palustris* Linn.	Low tufted herb	Yellow	7—9	11	Karponang Zemu Singalilia	10000 to 15000	Temperate marshes	Temperate Northern Hemisphere	...
C. palustris									
var. *normalis*	Do.	Yellow	...	...	...	...	...	...	...
var. *alba*	Do.	White	...	...					
C. scaposa H.f. & T.	Low herb	Yellow	7—9	...	Zelapla Lonak Jongri	12000 to 14500	Alpine Himalayan marshes	...	...
Genus **CALATHODES** *C. palmata* H.f. & T.	Perennial erect leafy herb	Golden Yellow	...	...	Dickchu valley	10000	Temperate	...	...
Genus **TROLLIUS** *T. pumilus* Don.	Root stock horizontal	Yellow	7—10	11	Thangu Changu	14000 16000	Alpine	Nepal to Sikkim	...

(*To be continued*).

A CONTRIBUTION TO THE ORNITHOLOGY OF THE SUNDERBANS

By

S. C. Law

(*Continued from p. 90, Vol. XXVI, No. 2*)

Itinerary

1944: August 2. Leave Khulna town at 1-30 p.m. by D.F.O.'s Launch; visit on the way *Chalna Hat* (local market) and surrounding country-side; enter into the Sunderban reserved forest and anchor for the night in the *Aurasipsah* river.

August 3. Starting at 5-30 a.m. reach *Chunkuri Block* of reserved forest *via Cobaduk* and *Buri-goalini* late in the evening, and halt.

August 4. Taking recourse to jolly boat and wending our way through a maze of creeks and nullahs visit the reputed heronry (Law, 1951)—an enormous nesting colony within typical Sunderban tree forest of *Anastomus oscitans* (Bodd.), *Egretta intermedia* (Wagler), *Egretta garzetta* (Linn.), *Bubulcus ibis coromandus* (Bodd.), *Nycticorax nycticorax* (Linn.), *Phalacrocorax niger* (Vieill.) and *Anhinga melanogaster* Penn.

August 5. Leave Chunkuri at 5-30 a.m.; proceed towards *Nilkamal*, arriving there in the afternoon. Halt till August 7.

August 6. Visit forests in the sea face, accessible from *Nilkamal by boat*.

August 7. Start after lunch for *Mankiduania Khal*; halt there.

August 8. Leave *Mankudiana* at 10-30 a.m. for *Baithaghata via* the *Jaimuni* and *Nalia-nala*, and halt.

August 9. Start for Khulna town.

1946: January 5. Leave Calcutta at 11 a.m. by S. S. "Janardan" arranged for the trip *via* Sunderbans to East Bengal.

January 6. Making way past the Channel Creek encounter at *Namkhana* a huge flock of White Ibis; proceed across the *Saptamukhi via Habila* Creek onwards through *Olian Nala* till the *Matla* is reached.

At sunset, while the steamer was moving on along the Sunderban forest area lying in the district of 24-Perganas no observation was possible.

January 7. At daybreak proceeding across the *Raimangal* reach Khulna Sunderban border. Right through the forests proceed slowly along *khals* and rivers till in the evening the *Aurasipsah* is crossed; move up *via Sutarkhali Khal;* halt due to bad visibility on account of mist.

January 8. Proceed along the *Passar* reach Khulna town in the forenoon.

SYSTEMATIC LIST OF SPECIES

This list includes all the species observed and identified during my excursion to the Sunderbans, as well as those noticed or obtained alive as a result of periodical collecting for very many years in some contiguous areas. In attempting, for the sake of completeness, to make use of information found in the literature it soon became apparent to me that the whole Sunderban country has been much neglected ornithologically, notwithstanding Blyth's (1847) remarks "that the animal inhabitants of this notoriously baleful region are far from being so little known as is commonly supposed." * Blyth's pioneer work along with the contribution of Pearson, Sundevall and others concerning Bengal avifauna generally, and not directly dealing with the Sunderban region, was over hundred years old and quite out-of-date. The only recent published reference seems to have

*One might weigh this against his (1844) another statement "With respect to my own opportunities for outdoor observation, I may here repeat that they have hitherto been extremely few, for during the whole of the past year I was only one day absent from the Museum; but I have just now returned from a week's excursion in the direction of the Soonderbuns.

been a few stray notes by the writer on some birds occurring in the Sunderbans and in Central and South Bengal. The present paper while taking notice thereof supplements the account, with more attention to the birds of the forest areas.

Corvus macrorhynchus Wagler. Jungle Crow.

Found commonly in parties throughout my trip down to the sea face; prone to feeding on crabs and aquatic animals coming out of their burrows at low tide while water recedes from high banks of the khals. Noticed together with *C. splendens* in the bird-nesting colony in *Chunkuri* reserved block of swamp forest to hang about nests of such community-breeding birds as *Anastomus oscitans, Egretta intermedia, Egretta garzetta,* etc., waiting for an opportunity to pilfer eggs and young.

Corvus splendens Vieill. House Crow.

Observed in all forest areas visited. Sight of its following on the ground fishermen casting net is not uncommon near villages outside the reserved forest.

Dendrocitta vagabunda (Lath.). Bengal Tree-Pie.

Fairly common inside and outside the forest belt; noticed singly, often in pairs or parties of three or more.

Parus major Linn. Indian Grey Tit.

Not uncommon. Noticed even in forest at the sea face in mixed hunting parties of *Sitta frontalis, Pericrocotus peregrinus, Dryobates macei* (Law, 1948).

Sitta castanea Less. Chestnut-bellied Nuthatch.

Sight records of parties in Sunderban swamp forest, considerably inland and away from the sea face (Law, 1948). Partial to mature *Keora* (*Sonneratia apetala* Ham.) trees, which together with fair-sized *Sundri* (*Heritiera minor* Roxb.) and *Gengwa* (*Excoecaria agallocha* Linn.) apparently provide special haunt, on such haunt in swamp forest being noticed in the area known as *Firingi*.

Sitta frontalis (Swainson). Velvet-fronted Nuthatch.

Locally abundant; perhaps resident; haunting tree forests —notably Keora in the islands at or near the sea face. Associates not unoften with *Parus major* and *Dryobates macei* while in search of food amongst tall standing trees, almost dead, blasted and bare of leaves, as well as fallen logs or overturned stumps lying on sandy ground. Not observed in inland tracts of the swamp forest which harbour *S. castanea* (Law, 1948).

Turdoides terricolor (Hodgs.), Jungle Babbler

Common. Small parties often noticed in clearings and open parts around forest coupe.

Timalia pileata Horsf. Bengal Red-capped Babbler.

Sight record of small parties at places overgrown with clumps of shrubs and low bushes.

Resident, rather abundant locally, even outside Sunderbans, and distributed right along the alluvial plain beyond Khulna, in Jessore and 24-Perganas.

Malacocincla sepiaria abbotti (Blyth). Abbot's Babbler.

Not uncommon; haunting undergrowth of plants and bushes. Obtained outside forest area in the groves and *Pan*-houses or betel vine (*Piper betel* Linn.) cultivation inside jute-stalk structures (Law, 1945).

Well distributed in the district, its range virtually extending from the adjacent district (Jessore) through Khulna, eastward to Faridpur and Dacca in East Bengal.

Mixornis gularis rubricapilla (Tickell). Yellow-breasted Babbler.

Previously unknown like *Malacocincla s. abbotti* to occur in Central and South Bengal (Law, 1945). Apparently the most numerous of its family within the Sunderban area where its most congenial habitat is in the tangled brush along rivers and *khals*, large or small; noticed throughout the forest areas visited, its characteristic, oft-repeated note revealing its presence.

Aegithina tiphia (Linn.). Common Iora

Fairly distributed throughout; observed near the sea face.

Chloropsis aurifrons (Temm. & Laug.) Gold-fronted Chloropsis.

Sight record of several birds in swamp forest, haunting tall *Sundri* (*Heritiera minor* Roxb.) trees alongside khals; in pairs or small numbers, fighting and chasing one another—apparently indicating their status as resident species, not stragglers.

The past record of its occurrence in Lower Bengal (Jerdon, 1863) or near Calcutta (Cunningham, 1903) is belied by the total absence of the species now in the contiguous district of 24-Perganas and in Jessore, where whatever odd individuals are casually observed may very well have been escaped from the cage (Law, 1936).

Molpastes cafer (Linn.). Red-vented Bulbul.

Very common; found in all forest areas visited.

Otocompsa jocosa (Linn.). Red-whiskered Bulbul.

Noticed rather near forest fringes than inside; also around open villages.

(To be continued)

Photo of thousands of Garganey on the Vembanad Lake in Travancore-Cochin State.

—Taken by Mr. Christopher Dove.

MISCELLANEOUS NOTES

THE TRAVANCORE-COCHIN STATE BACKWATERS AND THE VEMBANAD LAKE AND THE GARGANEY ON THE LATTER.

Mr. Christopher Dove has kindly given me the following information about the Travancore-Cochin Backwaters and the Vembanad Lake :—

"The Vembanad Lake is part of the general Backwaters that stretch all the way from north of Cochin down to the south of Quilon. The only outlet/inlet to the sea is at Cochin although there is a spillway at the Hapillai, a few miles south of Alleppey, which helps to get rid of some of the water during the monsoon.

"The Backwaters become saltish from about December onwards as soon as the monsoon flood-water has been dispersed and gets progressively more and more saltish until the monsoon in May. Now (March) it is very saltish. As the salt is not good for the paddy which is now being grown all over the Kistanad area on the east side of the lake, where large-scale reclamation is in progress, there is a talk of constructing some sort of barrier at the northern end of the lake by Thanneermukkom".

The photograph taken by Mr. Christopher Dove shows the thousands of Garganey which frequent the Lake. There are also some scattered smaller flocks here and there.

While staying with our friend, Maurice Strauss, at Alleppey, a party of us visited the Lake in his launch, on the 16th January, 1952. There were two guns, one with Maurice Strauss and the other with Robert Baker who has a beautiful home on the bank of the Lake, where we had lunch. They fired four barrels and retrieved 48 Garganey but a number of others were not picked up as some boats appeared on the spot and made off with some of the bag. We chased them and recovered some of the birds but others got away. It was a most enjoyable trip.

COONOOR, NILGIRIS, *20th April, 1953.* — CHAS. M. INGLIS, F.Z.S., C.M.B.O.U.

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GS